High Performance Network Applications Team

Briefing to the

PITAC NGI WG

Bill Turnbull, NOAA

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Outline

- Mission
- Accomplishments/Coordination and Outreach

Mission (1)

The HPNAT *coordinates* Federal activities and R&D efforts to maintain and extend U.S. technological leadership in high performance networking applications through research that employs leading edge networking technologies, services, and performance in the support of advanced applications. These advances will lead to new and more capable network applications to support Federal agency missions, and will provide the foundation as well as economic benefits for the continued evolution of the National Information Infrastructure. To accomplish this, the HPNAT will:

Mission (2)

- Encourage *professional communities* with potential applications to develop prototype applications;
- Encourage and facilitate *interagency collaborations* in large scale networking applications research and development programs;
- Address requirements in large scale networking applications by *coordinating applications requirements with the research agendas* of federal agencies, universities and industry;
- Provide *mechanisms for cooperation* in large scale networking applications and development among Federal agencies, government laboratories, academia, industry, and other elements of the private sector; and
- Organize *information dissemination* activities including technology demonstrations, workshops and seminars

Sample Applications Areas

- Crisis Response
- Health Care
- Environment
- Education
- General Science
- Manufacturing
- Federal Information Services
- Collaboration
- Distributed Computing
- Security & Privacy
- Digital Libraries
- Remote Operations

NGI Applications Matrix

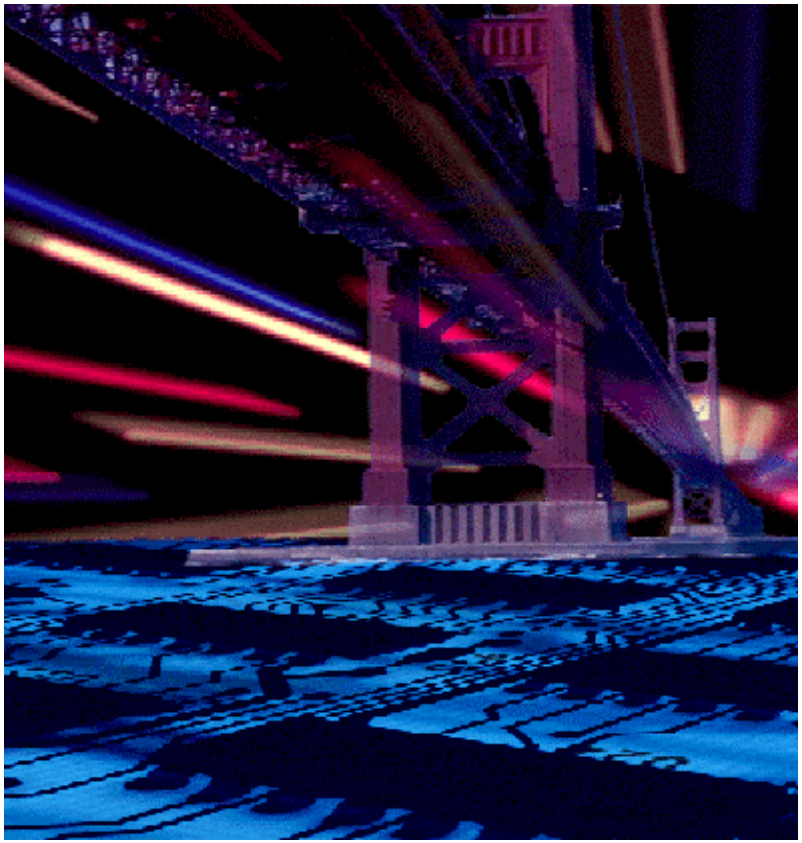
	Collaboration	Distributed Computing	Remote Operations	Security	Digital Libraries
Medical	X	X	X	X	X
Environment	X	X	X	X	X
Manufacturing	X	X	X	X	X
Education	X	X	X	X	X
Crisis Management	X	X	X	X	X
Federal Information Services	X	X		X	X
Basic Science	X	X	X	X	X

Selected Accomplishments

- Information Dissemination - Demonstrations
  - Netamorphosis
  - SC98 and SC99
  - IT^2 on the Hill
- Briefing to I2 Applications workshop and member meetings, SURA, CENIC, EPSCoR, Great Plains,
- Briefings to Discipline meetings
  - Radiologists
  - American Meteorological Society
  - Hazards Research and Applications Workshop
  - CEOS/GOIN
- DoE Workshop on Collaborative Problem Solving for Scientific Research
- Advanced Networking Infrastructure Needs for Atmospheric Sciences
- Virtual Laboratories Workshops

Accomplishments

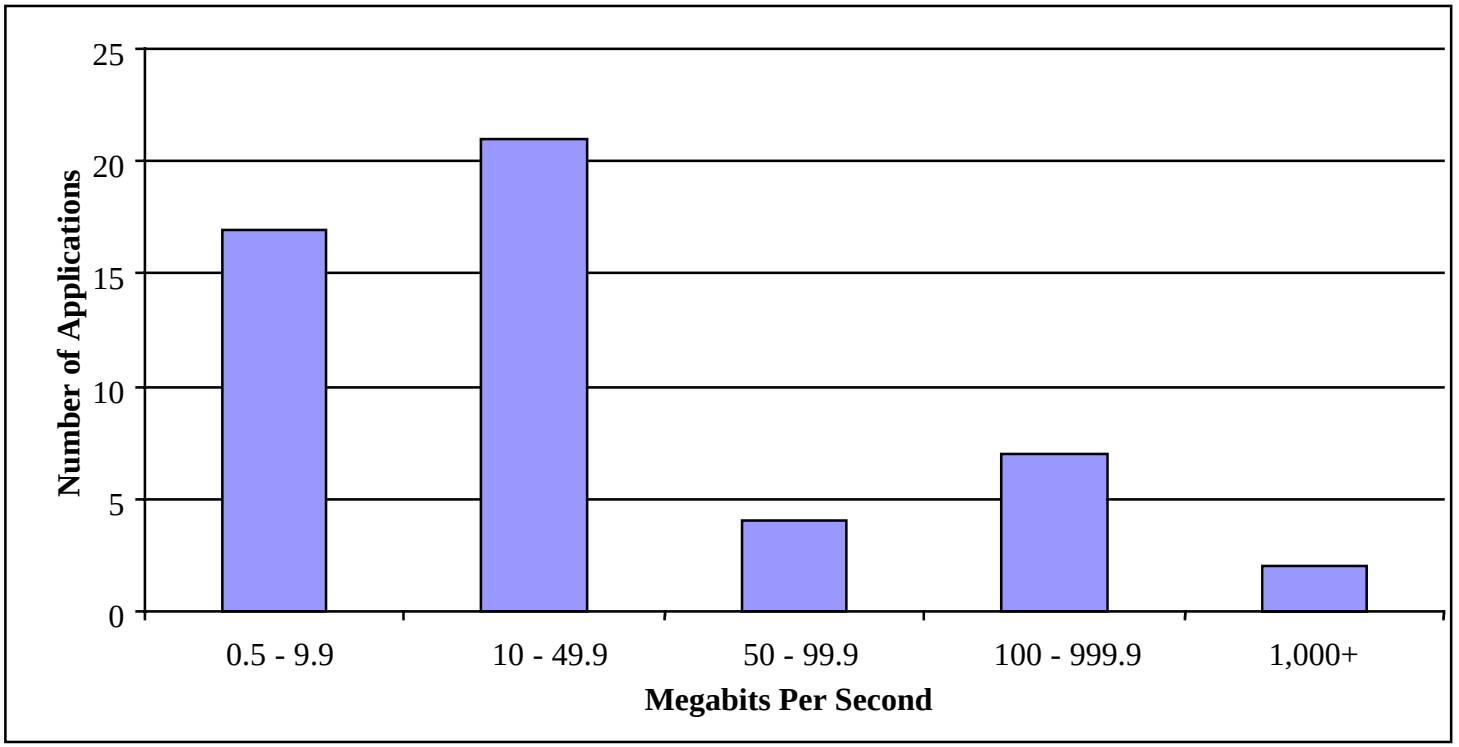
- Bridging the Gap
  - Technologies
    - Multicast
    - QoS
    - Security
  - Applications - 15
  - Testbeds
  - Report
- www.nren.nasa.gov/BTGreport



Applications Spreadsheet

- Total number of documented applications: 96
- Number of multi-organization applications: 16
- Bandwidth characterization
- Services (multicast,reservation, latency, jitter, security)

Bandwidth Utilization



Note: Total number of documented applications is 96 of which 51 indicated peak bandwidth

Applications by Category

Health Care	28
Environment	15
Education	13
Basic Science	37
Manufacturing	9
Collaborative Technologies	32
Distributed Computing	6
Security and Privacy	4
Digital Libraries	6
Remote Operations	17
Crisis Management	1
Federal Information Services	4

NGI Networking Applications (1)

- DARPA NGI applications
  - CSU-CHILL Radar distributed data: Remote sensing and meteorological analysis
  - Matisse: Computer microvision workstations
  - Digital Earth: Open, distributed, scalable, multi-resolution 3-D representation of the Earth
  - Digital Amphitheater: Multicasting HDTV
- DOE NGI applications
  - Distributed X-ray crystallography
  - Corridor One: Distance visualization environment
  - Combustion Corridor: Remote visualization capability

NGI Networking Applications (2)

- NASA NGI applications
  - Distributed video observation of shuttle processing and launch activities
  - Tropospheric radio scattering beam communications for remote areas
  - Virtual Collaborative Clinic: Remote three-dimensional images of the human body
  - Digital Earth: see DARPA
  - Biomedical interactive images collaboratory
  - Collaborative remote electron microscopy

NGI Networking Applications (3)

- NIH NGI applications
  - Indianapolis Testbed Network: Nursing home televideo
  - IP Video Telemedicine and Pediatric Cardiology Education
  - NGI Testbed for medical imaging applications
  - Multicenter clinical trial of new therapies using NGI technology
  - Patient controlled personal medical records system
  - Remote, real-time simulation for teaching human anatomy and surgery
  - Human embryology digital library and collaboratory support tools
  - Biomedical Tele-immersion
  - Medical nomadic computing applications during patient transport
  - Pathology image recognition database remotely accessible
  - Patient-centric tools for regional collaborative cancer care using NGI
  - NGI implementation of a visible human dataset
  - Networked 3D virtual human anatomy
  - Mamography for the NGI

NGI Networking Applications (4)

- NSF NGI applications
  - International Collaboration for Virtual Reality and Telepresent Environments
  - Advanced Regional Weather Prediction System (ARPS)
  - CAVERN: Research in teleimmersion and intelligent data mining
  - Studies of Ion Channel Blockade
  - Hybrid Rocket Combustion Characterization
  - Study of Conductive Polymers
  - Tele-Veterinary Medicine/Distance Education
  - Interdisciplinary digital library for the humanities
  - Adaptive and Nonlinear Methods in Signals and Imaging
  - Tele-nanoManipulator: network services, collaboratories, visualization, remote instrumentation
  - Internet HDTV: Very high quality streaming data
  - Phase 3 Internet HDTV: Five concurrent HDTV streams
  - Digital libraries: 2.5 Tbytes, 100 processors with IBM RS/6000 (1G RAM, 4 processors) Trans-Pac: Network infrastructure to support international research and education applications requiring high performance networks
  - Collaboratories: Common component architecture toolkit

NGI Networking Applications (5)

- NSF NGI applications (continued)
  - Direct transmission of IEEE-1394
  - Digital Video from commercial DV cameras encapsulated in IP
  - DIVE-3D Interactive Volume Explorer for Collaborative Investigation of Medical and Scientific Volumetric Data
  - Distributed computational testbed for Maximum Likelihood Analysis of Phylogenetic Data
  - Variations Digital Music Library
  - Megaconference: Use of H.323 protocol to link network researchers at 65 institutions on three continents
  - High Energy and Nuclear Physics on the Net: Large data file transfer
  - Psychological Services to Deaf Individuals via Telemedicine
  - fMRI Image Database Project
  - ENVISAGFE: Environmental visualization and geographic exploration
  - Distance Independent Tele-Medical Diagnosis
  - Wide-area interactive teaching
  - Video Streaming: track meet events in near-TV quality streaming video
  - High Performance Distributed Computing

NGI Networking Applications (6)

- NSF NGI applications (continued)
  - Columbia Digital Library
  - Electrical engineering instruction via IP (H.323)
  - Remote Observing: Mauna Kea observatory remotely
  - Bioinformatics: remote comparisons of molecular structures against protein, genome, and molecular trajectory data collections
  - Digital Archive: Integrate digital libraries with remote storage systems for storing collection holdings
  - Telescience: Remote Instrumentation, Collaboratories
  - Web TerraFly allows users to fly over and manipulate spatial data over the Web
  - MRI: Performing real-time mesoscale numerical weather prediction modeling at 10 research institutions
  - NASA Rainfall Estimation program participant: Rainfall Predictions
  - Man computer Interactive Data Access System (McIDAS)
  - DAFFIE: Distributed Applications Framework for Immersive Environments
  - The TelePath paradigm: Telemedicine & Network Stress Testing
  - Scaling of Internet Connections to Support Research Applications
  - Collaborative Development of 3D Life Science Educational Resources

NGI Networking Applications (7)

- NSF NGI applications (continued)
  - Large Scale Video Network Prototype (LSVNP): Architectures for video services
  - Legion: An object based distributed parallel processing system for solving large computational problems
  - Center for Advanced Spatial Technologies: Value-added distribution of very large geospatial data sets and applications
  - CERHAS: Researching use of human characters in virtual reality
  - The Space Physics and Aeronomy Research Collaboratory (SPARC)
  - Use of Parallel Computing in Ecological Modeling
  - Landsat TM Radiometry: Transfer of large data sets to facilitate instrument characterization
  - Landsat 7 Science Team: Transfer of large data sets to facilitate instrument characterization
  - Remote Imaging of Electrode Surface Luminescence
  - Advanced Atmospheric Modeling
  - Oregon Gigapop - Multicast Broadcasting & Deployment
  - ICAIR: Advanced media collaboratories, visualization, remote instrumentation, e-commerce, heath sciences, weather

NGI Networking Applications (8)

- NSF NGI applications (concluded)
  - The Living Schoolbook: Education information infrastructure
  - Remote Data Mining using the information power grid
  - Project Data Space/Terabyte Challenge: Wide area data mining
  - Virtual World Data Server
  - Distributed Image Spreadsheet: Visualization, weather, collaboratories
  - Species Analyst: Tools that provide simultaneous access to multiple biological collection databases.
  - Partnership for Biodiversity Informatics collaboratory
  - Backyard Biodiversity: Knowledge network of biodiversity information
  - Public Television Internet2 Next Generation Interconnection Pilot
  - A Multicenter Clinical Trial using NGI Technology
  - Use of computers at ORNL: Studying grain boundary and heterogeneous interfaces